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Data in the MSMR is provisional, based on reports and other sources of data available to the Medical Surveillance Activity. Notifiable conditions are reported by date of onset (or date of notification when date of onset is absent). Only cases submitted as confirmed are included.

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Surveillance Trends

Varicella among Active Duty Soldiers January 1990-June 1997

When varicella zoster virus (VZV) infects healthy children, it generally causes chickenpox, a mild self-limited febrile illness with a characteristic vesicular rash. VZV infections of older or immunocompromised hosts can have more serious clinical consequences (e.g., primary VZV pneumonia).[1] Primary VZV infection generally results in lifelong immunity against chickenpox recurrences – and latent infection of dorsal root ganglia. Reactivation of VZV later in life causes herpes zoster (shingles) a painful herpetic rash in the distribution of sensory nerves of affected ganglia.

VZV spreads from person to person by direct contact or via the respiratory route. It is extremely contagious, and most Americans are infected as children. VZV can spread with remarkable efficiency among immunologically naïve members of military units. The potential for VZV to cause outbreaks in military settings, disrupting military operations and training, defines to a great extent its military importance.[2,3]

In March 1995, a live, attenuated VZV vaccine was licensed for use in healthy persons $\geq$ 12 months of age. In July 1996, among other recommendations, the Advisory Committee on Immunization Practices of the US Public Health Service recommended that all susceptible children receive VZV vaccination and that vaccination be considered for susceptible persons who live or work in environments in which varicella transmission can occur (e.g., military personnel).[4] The US Army is currently assessing costs in relation to benefits of immunizing new trainees and/or other groups of soldiers. This report summarizes the varicella experience of active duty soldiers during the period January 1990 to July 1997.

Methods: All hospitalizations of active duty soldiers were searched to identify those with discharge diagnoses of varicella (ICD-9 code: 052.0-052.9). In addition, all cases of varicella among soldiers reported through the Army's automated disease reporting system were identified. Hospitalization and otherwise reported varicella records were integrated with military personnel and military applicant data to document demographic, military experience, and home of record information for cases and contemporaneous active duty noncases. Expected numbers of varicella cases by states/territories of residence prior to service were calculated by multiplying the total number of varicella cases by each state/territory's proportional representation in the Army. The statistical significance of variations between state-specific observed and expected cases were then assessed in relation to the chi square distribution. Finally, for geographic summaries, states were considered coastal or noncoastal based on criteria of the Population Distribution Branch, US Bureau of the Census.[5]

Rates, trends: Between January 1990 and July 1997, there were 3,705 hospitalizations and

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otherwise reported cases of varicella among soldiers. The overall varicella incidence rate for the period was 87.9 cases per 100,000 soldiers per year. In general, rates were highest early (1990), were relatively stable during the middle five years (1991-5), and were lowest at the end. Figure 1 shows the remarkable seasonal variability of varicella incidence with peaks in mid-winter (January-February), secondary peaks in mid-spring (May), and troughs in early fall (September-October).

Demographic: Varicella rates did not significantly vary between males and females. There were, however, significant differences in relation to race/ethnicity. The varicella rate among hispanic soldiers was more than twice that among white, nonhispanic soldiers; and incidence rates among black, nonhispanic soldiers and soldiers of other and unknown race/ethnicities were intermediate. Varicella rates declined significantly with increasing age. Soldiers younger than 20 years old were nearly 50 times more likely to be hospitalized or otherwise reported with varicella than those older than 40 (table 1, page 8).

Geographic: Figure 2 (page 9) shows the distribution of varicella cases in relation to states/territories of residence prior to Army service. Significantly more cases than expected occurred among soldiers from island (e.g., Puerto Rico, Virgin Islands, Hawaii) and coastal (e.g., New York, New Jersey, Maryland, Florida, California) states/territories. Cumulative incidence among soldiers from the Virgin Islands and Puerto Rico were 13.6 and 6.6 times higher, respectively, than the overall cumulative incidence. Soldiers from 7 (28%) of 25 coastal states (including the District of Columbia) had significantly more varicella cases than expected; in contrast, none of 26 inland states had significantly more cases than expected, but 12 (46.2%) of them had significantly fewer.

Comment: The recent licensure of a safe and effective VZV vaccine has refocused attention on costs and potential benefits of routinely immunizing

Continued on page 8

Figure 1. Varicella rates by month, active duty Army, January 1990 - June 1997

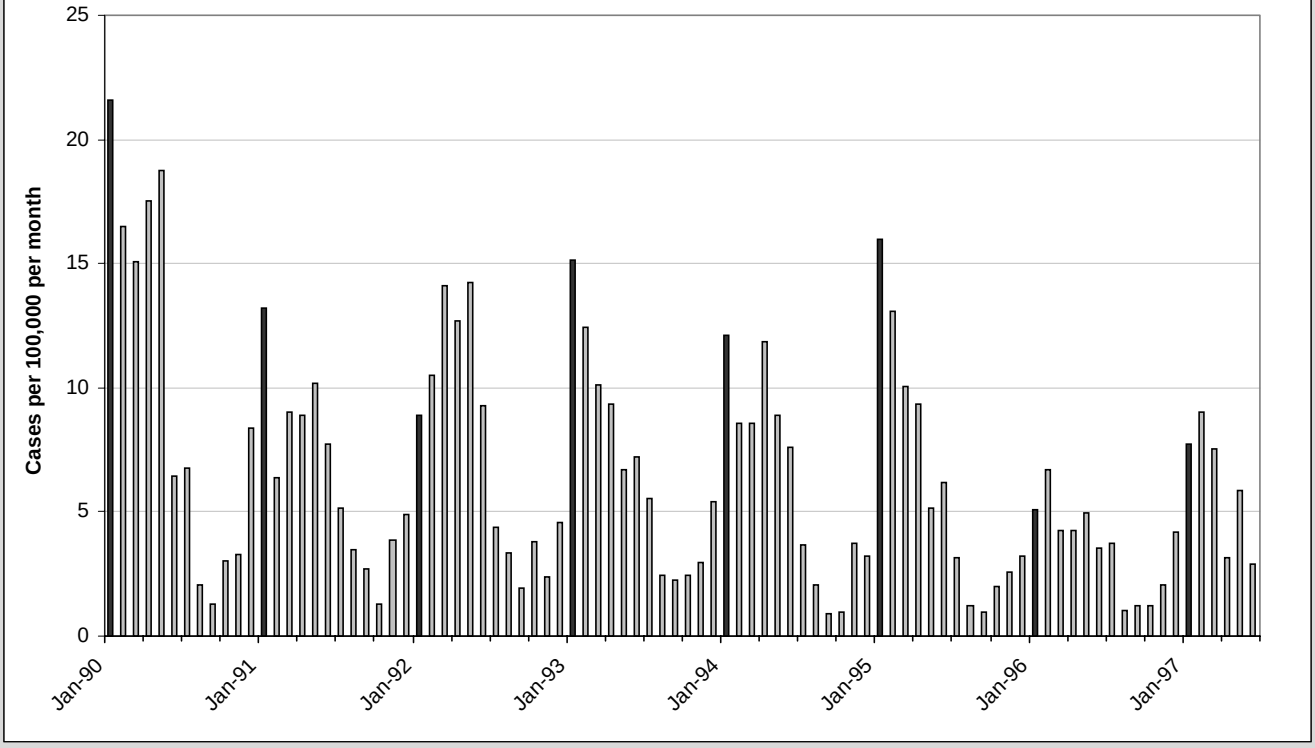


TABLE I. Selected sentinel reportable diseases, US Army medical treatment facilities* September, 1997

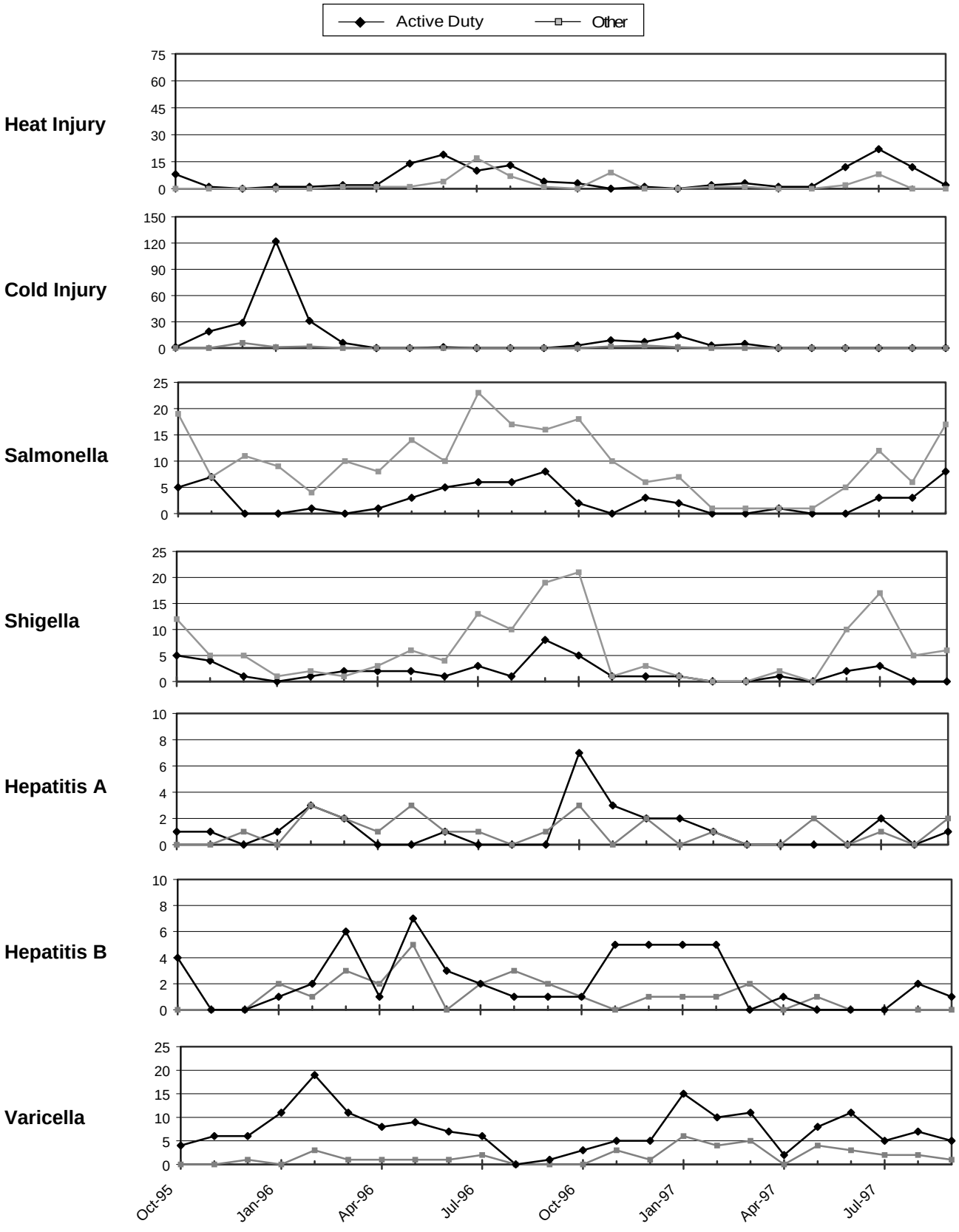
Reporting MTF/Post**	Total number of reports submitted September 1997	Environmental Injuries		Viral Hepatitis		Salmonellosis		Shigella		Varicella	
		Active Duty				Active Duty	Other	Active Duty	Other	Active Duty	Other Adult
		Heat	Cold	A	B						
		Cum. 1997	Cum. 1997	Cum. 1997	Cum. 1997	Cum. 1997	Cum. 1997	Cum. 1997	Cum. 1997	Cum. 1997	Cum. 1997
NORTH ATLANTIC RMC											
Walter Reed AMC	45	0	0	0	1	1	2	0	1	2	3
Aberdeen Prov. Ground, MD	6	2	0	0	0	0	0	0	0	0	0
FT Belvoir, VA	196	0	0	0	3	1	5	0	3	0	0
FT Bragg, NC	59	7	8	0	0	1	35	9	57	0	0
FT Drum, NY	64	2	1	0	0	0	0	0	0	4	0
FT Eustis, VA	12	11	0	1	1	0	6	0	7	4	0
FT Knox, KY	26	7	0	0	0	0	0	0	0	0	0
FT Lee, VA	2	0	0	0	0	0	0	0	0	0	0
FT Meade, MD	15	0	0	0	0	0	1	0	0	0	0
West Point, NY	13	0	0	0	1	0	1	0	0	1	0
GREAT PLAINS RMC											
Brooke AMC	49	5	0	3	0	2	3	0	3	0	0
FT Carson, CO	68	2	0	1	2	1	1	0	0	0	0
FT Hood, TX	305	5	0	4	3	0	2	0	0	3	0
FT Leavenworth, KS	2	0	0	0	1	1	0	0	0	0	0
FT Leonard Wood, MO	23	4	2	2	0	0	0	0	0	15	7
FT Polk, LA	15	7	1	0	0	0	0	0	0	0	0
FT Riley, KS	18	5	0	0	0	0	1	0	1	0	0
FT Sill, OK	37	12	0	2	4	0	1	0	0	0	0
SOUTHEAST RMC											
Eisenhower AMC	0	0	0	0	1	0	0	0	0	0	0
FT Benning, GA	8	23	0	0	0	1	0	0	0	4	10
FT Campbell, KY	63	6	13	0	0	1	2	2	3	12	7
FT Jackson, SC	115	0	0	0	1	2	1	0	0	9	0
FT McClellan, AL	13	1	0	0	0	0	0	0	0	0	0
FT Rucker, AL	5	4	0	0	0	0	0	0	0	0	0
FT Stewart, GA	10	4	0	0	0	0	2	0	0	4	0
SOUTHWEST RMC											
Wm Beaumont AMC	58	0	0	1	1	0	3	0	0	11	3
FT Huachuca, AZ	0	0	0	0	0	0	0	0	0	1	0
FT Irwin, CA	3	1	0	0	0	0	0	0	0	0	0
NORTHWEST RMC											
Madigan AMC	73	0	0	4	0	1	9	0	0	0	0
FT Wainwright, AK	0	0	0	0	0	0	0	0	0	0	0
PACIFIC RMC											
Tripler AMC	9	2	0	1	1	0	1	0	0	0	0
OTHER LOCATIONS											
Europe	118	2	1	2	10	16	29	0	4	17	0
Korea	25	7	0	0	8	1	0	1	1	5	0
Total	**1455**	**119**	**26**	**21**	**38**	**29**	**105**	**12**	**80**	**92**	**30**

* Based on date of onset.

** Reports are included from main and satellite clinics. Not all sites reporting.

Date of Report: 7-Oct-97

FIGURE I. Selected sentinel reportable diseases, US Army medical treatment facilities*
Cases per month, Oct 95 - Sep 97



* Reports are included from main and satellite clinics. Not all sites reporting.

Date of report: 7-Oct-97

TABLE II. Reportable sexually transmitted diseases, US Army medical treatment facilities* September, 1997

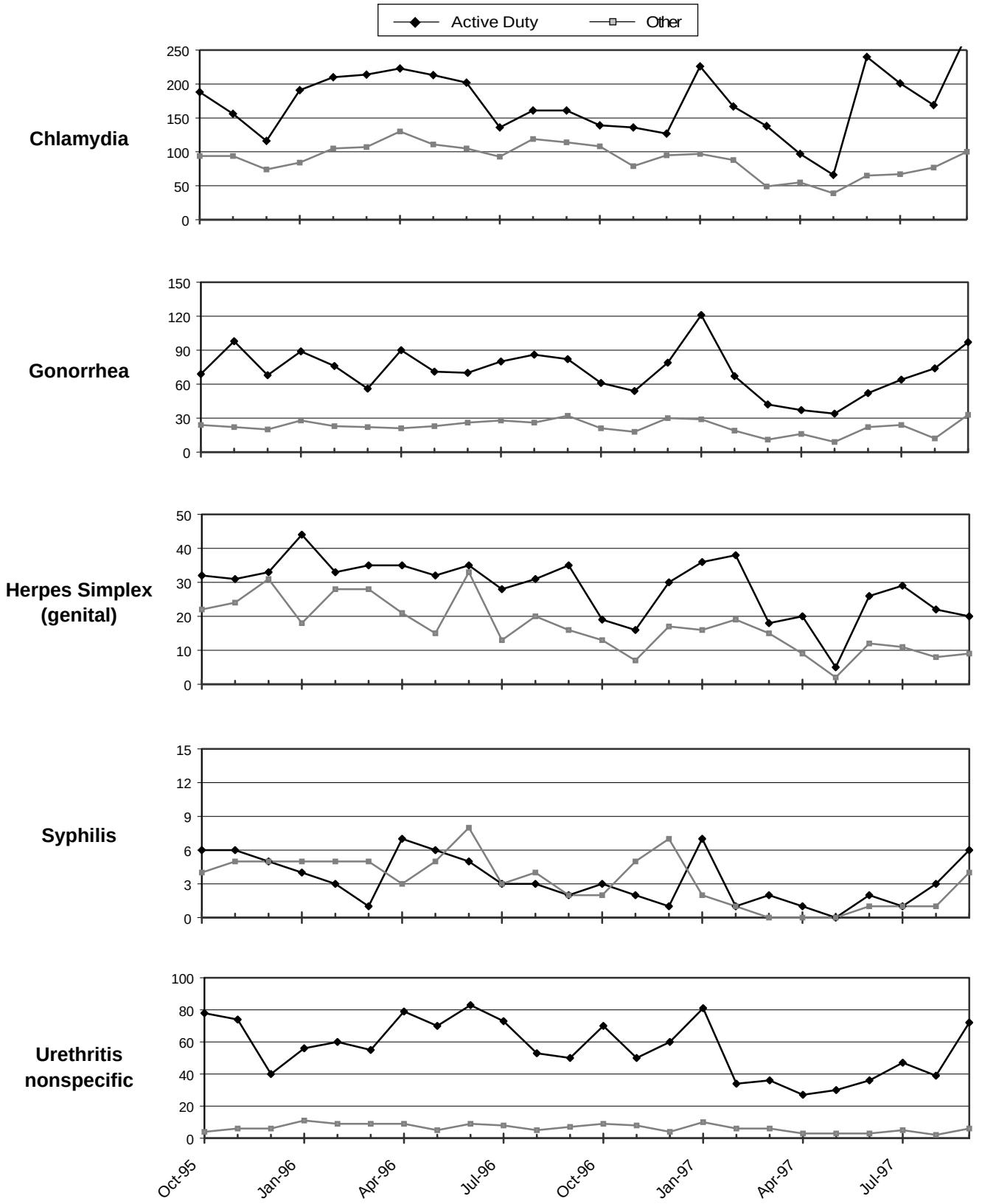
Reporting MTF/Post**	Chlamydia		Urethritis non-spec.		Gonorrhea		Herpes Simplex		Syphilis Prim/Sec		Syphilis Latent		Other STDs**	
	Cur. Month	Cum. 1997	Cur. Month	Cum. 1997	Cur. Month	Cum. 1997	Cur. Month	Cum. 1997	Cur. Month	Cum. 1997	Cur. Month	Cum. 1997	Cur. Month	Cum. 1997
NORTH ATLANTIC RMC														
Walter Reed AMC	2	39	1	7	1	16	1	14	0	1	0	0	0	0
Aberdeen Prov. Ground, MD	0	16	0	2	0	22	0	7	0	0	0	0	0	0
FT Belvoir, VA	16	114	0	0	4	29	0	5	0	1	0	0	2	5
FT Bragg, NC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FT Drum, NY	8	67	0	4	4	28	1	6	0	0	0	0	0	0
FT Eustis, VA	9	97	0	0	0	16	0	0	0	0	0	1	0	0
FT Knox, KY	11	86	0	0	8	44	4	34	0	0	0	2	0	0
FT Lee, VA	2	12	0	0	0	1	0	0	0	0	0	0	0	0
FT Meade, MD	0	6	0	3	0	1	0	2	0	0	0	0	0	0
West Point, NY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GREAT PLAINS RMC														
Brooke AMC	14	126	0	0	2	42	0	7	0	0	0	0	0	0
FT Carson, CO	27	211	22	178	9	63	3	34	0	0	0	1	0	0
FT Hood, TX	90	486	15	151	53	264	5	47	5	9	1	2	0	5
FT Leavenworth, KS	1	20	0	0	0	5	0	0	0	0	0	0	0	0
FT Leonard Wood, MO	10	73	8	23	2	24	0	0	0	0	0	1	0	0
FT Polk, LA	7	50	0	0	1	15	0	3	0	0	0	2	0	3
FT Riley, KS	6	132	0	0	0	26	0	0	0	0	0	1	0	1
FT Sill, OK	13	138	2	32	7	59	0	9	0	0	0	0	1	5
SOUTHEAST RMC														
Eisenhower AMC	0	54	0	0	0	14	0	31	0	0	0	0	0	7
FT Benning, GA	1	39	0	0	1	49	0	25	0	1	0	2	0	0
FT Campbell, KY	25	210	0	0	12	128	1	21	0	0	0	1	0	1
FT Jackson, SC	69	638§	0	0	2	19	3	41	0	1	0	0	1	3
FT McClellan, AL	3	6	0	0	2	5	0	0	0	0	0	0	0	1
FT Rucker, AL	1	5	0	0	0	0	0	0	0	0	0	0	0	0
FT Stewart, GA	10	90	11	119	10	87	1	47	0	0	0	2	0	27
SOUTHWEST RMC														
Wm Beaumont AMC	9	218	0	0	2	36	0	36	0	2	0	1	0	2
FT Huachuca, AZ	0	27	0	0	0	2	0	2	0	0	0	0	0	0
FT Irwin, CA	0	24	0	0	0	5	0	4	0	1	0	0	0	0
NORTHWEST RMC														
Madigan AMC	13	192	19	92	6	55	1	36	0	0	0	0	0	0
FT Wainwright, AK	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC RMC														
Tripler AMC	16	103	0	0	4	38	9	59	0	0	0	0	0	0
OTHER LOCATIONS														
Europe	8	397	0	10	0	100	0	24	0	2	0	0	0	1
Korea	2	16	0	0	0	1	0	1	0	0	0	0	0	0
Total	**373**	**3692**	**78**	**621**	**130**	**1194**	**29**	**495**	**5**	**18**	**1**	**16**	**4**	**61**

* Reports are included from main and satellite clinics. Not all sites reporting. Date of Report: 7-Oct-97

** Other STDs: (a) Chancroid (b) Granuloma Inguinale (c) Lymphogranuloma Venereum (d) Syphilis unspec. (e) Syph, tertiary (f) Syph, congenital

§ Includes participants in a large-scale ongoing chlamydia study (females only).

FIGURE II. Reportable sexually transmitted diseases, US Army medical treatment facilities*
Cases per month, Oct 95 - Sep 97



* Reports are included from main and satellite clinics. Not all sites reporting.

Date of report: 7-Oct-97

Table 1. Rates per 100,000 (number of cases) by gender, race/ethnicity, and age group, 1990-1997

		1990	1991	1992	1993	1994	1995	1996	1997	Total
Gender	**Males**	122.5 (796)	77.2 (491)	89.9 (505)	82.3 (419)	72.1 (343)	66.2 (294)	38.7 (162)	37.3 (152)	77.1 (3162)
	Females	118.7 (99)	80.1 (65)	107.8 (81)	86.2 (62)	76.5 (54)	93.6 (64)	42.8 (29)	41.9 (29)	82.2 (483)
Racial / Ethnic	**White**	86.4 (392)	59.6 (264)	67.6 (264)	62.2 (223)	46.5 (157)	49.5 (156)	25.6 (76)	26.4 (77)	55.7 (1609)
	Black	177.2 (373)	111.2 (228)	138.7 (252)	118.1 (190)	106.3 (158)	103.2 (143)	62.6 (82)	52.9 (68)	114.5 (1494)
	Hispanic	161.4 (49)	111.6 (34)	106.1 (30)	125.5 (34)	160.2 (43)	97.8 (26)	84.4 (23)	101.0 (27)	119.0 (266)
	Other	210.8 (81)	76.7 (30)	110.0 (40)	101.7 (35)	117.0 (39)	103.1 (33)	32.7 (10)	26.6 (22)	100.6 (276)
Age group	**< 20**	343.8 (224)	219.9 (111)	204.1 (80)	202.7 (76)	142.4 (48)	144.7 (42)	91.6 (29)	81.5 (28)	198.7 (638)
	20-24	205.6 (505)	122.9 (298)	170.7 (360)	154.1 (298)	127.6 (229)	115.6 (189)	57.0 (84)	53.4 (76)	133.7 (2039)
	25-29	72.6 (122)	66.0 (109)	78.0 (112)	66.5 (86)	64.2 (78)	57.8 (68)	38.5 (44)	33.0 (37)	61.2 (656)
	30-34	25.5 (30)	25.4 (30)	27.2 (29)	17.8 (17)	36.1 (33)	35.0 (31)	25.8 (22)	26.5 (22)	27.2 (214)
	35-39	13.7 (11)	8.4 (7)	5.0 (4)	4.0 (3)	9.8 (7)	23.7 (16)	6.3 (4)	6.4 (4)	9.6 (56)
	≥ 40	5.3 (3)	1.7 (1)	1.8 (1)	4.0 (2)	4.1 (2)	6.5 (3)	2.3 (1)	2.3 (1)	3.5 (14)

Continued from page 3

soldiers.[6] Although VZV hospitalization rates have declined in recent years, chickenpox remains the vaccine-preventable disease with the highest incidence among soldiers.

Correlates of varicella risk documented in this report reiterate some, and extend other, findings from earlier surveys in military settings.[7-9] For example, incidence rates (and presumably immunologic susceptibility to VZV) are still highest among young, and thus the most junior, soldiers. Soldiers who represent racial and ethnic minorities still have higher rates of chickenpox than white, nonhispanic soldiers. However, while other surveys found increased immunologic susceptibility among females, in recent years chickenpox rates have been comparable among male and female soldiers.

Finally, consistent with past reports,[2,7,9-10] soldiers from island states/territories (e.g., Virgin Islands, Puerto Rico, Hawaii) continue to have much higher chickenpox rates than "mainland" soldiers. However, this report adds an interesting extension to this previously well-documented geographic-risk correlation. In recent years, soldiers from coastal states have had significantly higher chickenpox rates (and thus, presumably, lower preinduction VZV antibody prevalences) than those from inland states. This unanticipated finding must be validated through further analyses before its significance, if any, is determinable.

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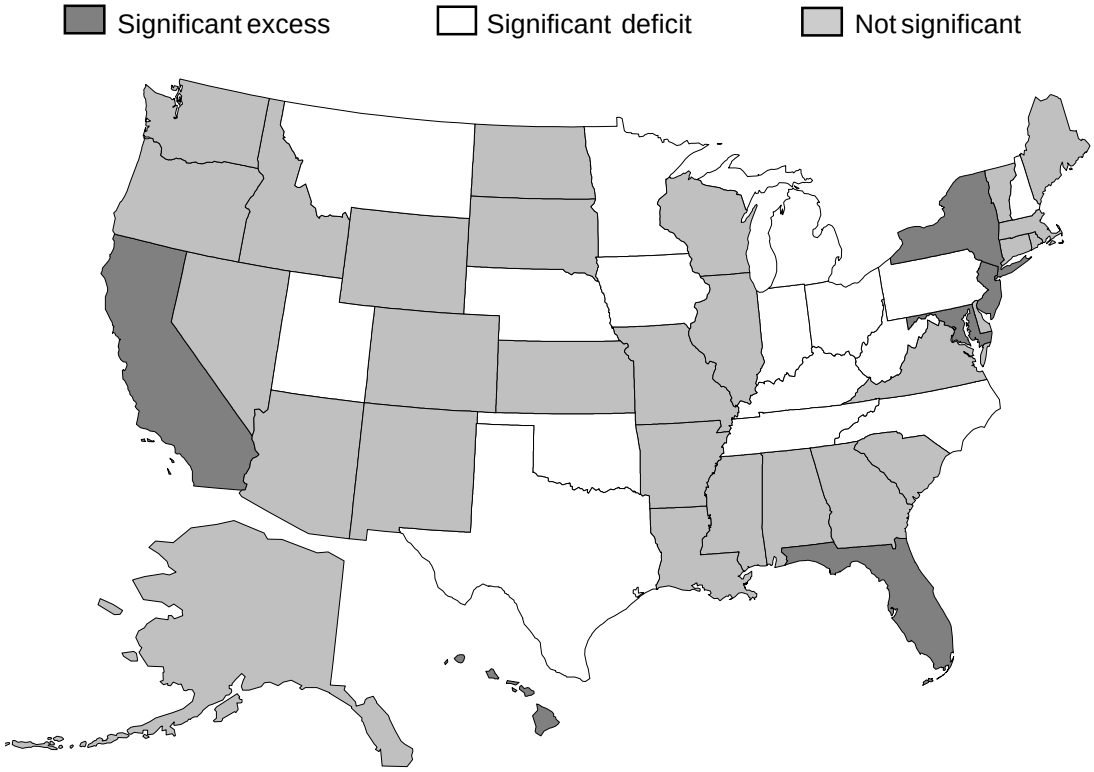
Figure 2. Geographic distribution of varicella cases, by residence prior to service
(significant excess/deficit p ≤ .05)



Excess cases (not shown) Puerto Rico and Virgin Islands

Table 2. Residence prior to service with significant excess/deficit of varicella cases

States/territories of residence prior to service with significant excesses of varicella (p ≤ .01)					
State	**Observed cases**	**Expected cases**	**Excess cases**	**O/E ratio**	**P value**
Puerto Rico	165	25.0	140.0	6.6	.001
California	352	269.7	82.3	1.3	.001
New York	239	163.7	75.3	1.5	.001
Florida	278	205.4	72.6	1.4	.001
New Jersey	89	52.7	36.3	1.7	.001
Virgin Islands	32	2.3	29.7	13.6	.001
Hawaii	19	10.3	8.7	1.8	.01
District of Columbia	14	6.4	7.6	2.2	.01
States/territories of residence prior to service with significant deficits of varicella (p ≤ .01)					
	Observed cases	**Expected cases**	**Deficit cases**	**O/E ratio**	**P value**
Texas	197	294.5	-97.5	0.7	.001
Ohio	92	147.5	-55.5	0.6	.001
Oklahoma	25	55.7	-30.7	0.4	.001
Minnesota	14	39.0	-25.0	0.4	.001
Iowa	14	35.7	-21.7	0.4	.001
Pennsylvania	104	135.7	-31.7	0.8	.01
Kentucky	37	58.4	-21.4	0.6	.01
Tennessee	42	62.0	-20.0	0.7	.01
West Virginia	20	35.4	-15.4	0.6	.01

Case Report

Typhoid Fever at Tripler Army Medical Center

Two days before his family's reassignment to Japan, an 11 year old boy became ill in Oahu, Hawaii, with fever and loose stools. Enroute to Japan, the family stopped in Guam to visit relatives. While there, the child continued with fever, mild cough, abdominal distention and loose stools. After 15 days of symptoms, he sought care and was admitted to the local US Naval Hospital.

The child's history was negative for unusual dietary exposures. All recent meals were eaten at home except during a trip to a local beach approximately a month before his illness. No family members or other contacts were ill. On admission the child had fevers from 103-104°F., abdominal distention, and hepatosplenomegaly. The rest of the physical examination was normal; specifically, there was no rash or limitation of joint movements. Laboratory evaluation revealed anemia and leukopenia (hematocrit: 18, WBCs: 3,700). Chest X-ray showed left lower lobe atelectasis, and CT scan revealed two 1 cm. diameter low density lesions in his spleen. He was transported to Tripler Army Medical Center with a tentative diagnosis of typhoid fever (culture results were unavailable at the time). Within several days of his arrival at Tripler, three stool cultures were positive for *Salmonella typhi*, confirming the diagnosis of typhoid fever. The child was placed on ceftriaxone until, after five days, his fever resolved. He was switched to oral amoxicillin to complete a 14-day course of antibiotics.

Stool cultures of the parents on two occasions were negative. Cultures of the siblings who remained in Guam were unavailable. Upon his discharge, isolation of the child was considered unnecessary; however, the family was instructed to prohibit the child from preparing food for others until stool cultures were negative on two separate occasions.

Another case of typhoid fever was recently diagnosed in a child treated at a local civilian medical facility. No links between the cases have been identified although epidemiologic investigations of the military and civilian cases on Oahu are continuing.

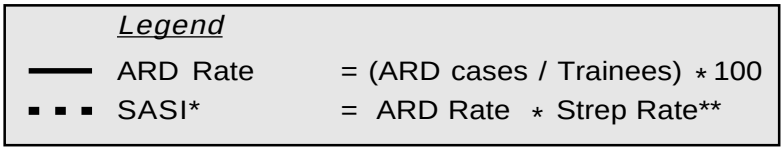
Information submitted by LTC Judy Vincent, Chief, Pediatric Infectious Disease; MAJ Joel Fishbain, Chief Infectious Disease; and Edwin Taniguchi, Dept Preventive Medicine, Tripler Army Medical Center.

Editorial Comment: Typhoid fever, caused by the organism *Salmonella typhi*, is relatively rare in the United States – only approximately 500 cases are reported annually. However, nearly 17 million cases of typhoid fever and approximately 600,000 deaths are attributable to *S. typhi* each year worldwide. *S. typhi* are transmitted by the fecal-oral route, usually in contaminated food, milk or water, and man is its only known natural reservoir. Approximately 10% of patients with typhoid fever shed *S. typhi* in stool for up to three months after acute infection. An estimated 2-5% of cases become chronic *S. typhi* carriers and potentially significant threats to the public's health.

When typhoid fever is diagnosed in a beneficiary of Army medical care, the case should be expeditiously reported to local civilian and military public health authorities. In turn, local Army preventive medicine activities are required to report all cases to the Army Medical Surveillance Activity through the automated reportable diseases surveillance system ("MSS"). Each case of typhoid fever should be thoroughly investigated – contacts of cases and possible sources of infection should be completely and carefully evaluated.

The typhoid carrier state may be identified through serology. Increased titers of antibody to purified Vi polysaccharide are highly suggestive of *S. typhi* carriage. Alternatively, carriers typically shed high numbers of bacteria in their stools; thus, carriers can usually be identified through stool cultures. Finally, all household and close contacts of a case should be excluded from employment in food handling or child-care until at least two negative stool cultures, taken 24 hours or more apart, are obtained.

ARD Surveillance Update



Ft Benning

Ft Jackson

Ft Knox

Ft Leonard Wood

Ft McClellan

Ft Sill

Figure III. ARD surveillance rates, submitted by Army TRADOC posts

* Strep/ARD Surveillance Index (SASI)

**Strep Rate= (GABHS(+) / Cultures) *100

Note: SASI has proven to be a reliable predictor of serious strep-related morbidity, especially acute rheumatic fever.

Report from the Field

Adenovirus, Type 4, Among Military Trainees, Fort Jackson, SC, Fort Gordon, GA

For more than two decades following World War II, adenoviruses were responsible for recurrent outbreaks of febrile acute respiratory diseases (ARD) among basic trainees. Through the winter months at many basic training posts, ARD rates of nearly 10% per week were not uncommon. Adenovirus types 4 and 7 were the most frequently implicated causes of training center outbreaks.

Adenovirus vaccine: During the 1960s, live oral vaccines against adenovirus types 4 and 7 were developed and shown in field studies to be safe and effective. Routine seasonal immunization of all male basic trainees against adenovirus types 4 and 7 was initiated in 1969. Following the 1984-1985 winter season, adenovirus vaccines began to be administered year round. Since then, in general, ARD rates have been relatively low and stable (approximately 0.3%-0.5% per week), and there have been no training center wide ARD outbreaks attributable to adenoviruses.

In 1996, the sole manufacturer of adenovirus vaccines delivered its last production lots and ceased further production. DoD efforts to identify a new manufacturer were initiated and are ongoing. In the meantime, current stocks of vaccines are being distributed only between 1 October and 31 March to maximize their availability during the higher risk winter months. The Food and Drug Administration recently granted an extension through August 1998 of the shelf life of on-hand vaccine. Thus, at current limited usage rates, it is projected that vaccine stocks will be depleted by approximately winter of 1999.

Laboratory-based adenovirus surveillance: To assess the current epidemiologic relevance and the epidemic potential of adenoviruses (particularly vaccine homologous serotypes 4 and 7), in May the preventive medicine staffs at Fort Jackson and Eisenhower Army Medical Center began laboratory surveillance of trainees with febrile ARDs. Every Fort Jackson basic trainee who presents on a weekday with a temperature of 100.5°F or greater and signs or symptoms of respiratory illness has two throat swabs taken for virus isolation studies — one is shipped to the Naval Health Research Center, San Diego, California, and the other is shipped to the virology laboratory of the Eisenhower Army Medical Center. Since samples are not collected on weekends, it is estimated that between 10 and 15% of ARD cases are not included in the laboratory surveillance.

ARD rates and trends: In accordance with current policy, the last doses of adenovirus vaccine were administered to new trainees at Fort Jackson on 31 March 1997. In June, ARD rates at Fort Jackson averaged 0.325% per week. Weekly rates gradually increased through the summer and early fall, and the ARD rate the first week of October was 0.8%, the highest reported weekly rate at Fort Jackson in 1997. While Fort Jackson's overall ARD rate is well below the "epidemic threshold" (1.5% per week) that is used for surveillance purposes, the 45-bed ARD ward has been filled several times since August, and clusters of ARD with significant operational impacts have affected several individual training units.

Preliminary results: Since laboratory surveillance began in the spring, there have been more than 200 isolations of adenovirus type 4 from trainees at Fort Jackson with febrile ARD. Preliminary analyses of virus isolation results suggest that adenovirus type 4 has been responsible for individual unit outbreaks and a significant and increasing proportion of all ARD among trainees at Fort Jackson. In addition, adenovirus type 4 isolation rates have been highest among trainees in the late weeks of basic training. Finally, adenovirus type 4 has been isolated from soldiers in advanced individual training (AIT) at Fort Gordon, who had recently completed basic training at Fort Jackson.

Information submitted by Rose Marie Hendrix, LTC, MC, Chief, Preventive Medicine Service, Fort Jackson, SC, and K. Mills McNeill, COL, MC, Director, Preventive Medicine Services, Eisenhower Army Medical Center, Fort Gordon, GA.

Editorial Comment: In the face of the medical and military operational threats presented by the lapsing supplies of adenovirus vaccines, Fort Jackson supplemented its routine ARD surveillance efforts with viral diagnostic support from Eisenhower Army Medical Center. This unique surveillance program has already provided critical insights into the nature, distribution, and epidemiologic and clinical characteristics of currently circulating adenoviruses. Within months of stopping routine adenovirus immunizations, adenovirus type 4 emerged as a major cause of febrile ARD among basic trainees: through the relatively low risk summer season, ARD rates and proportions of ARD associated with adenovirus type 4 have gradually increased; adenovirus type 4 has caused clusters of ARD in individual training units; adenovirus isolates have been most frequently recovered from trainees in the late weeks of basic training; and adenovirus type 4 isolates were recovered from AIT students with ARD who had recently left Fort Jackson.

The recent experience at Fort Jackson documents that adenovirus type 4 remains a significant threat to the safe, efficient, and orderly conduct of military training. The experience validates the Army's longstanding adenovirus immunization policies. Finally, military trainees can no longer be considered universally immune to adenovirus types 4 and 7; thus, preventive medicine staffs at basic and advanced individual training centers should consider adenoviruses, particularly types 4 and 7, as likely possible causes of febrile ARD among trainees.

Report from the Field

Ross River Virus Disease ("epidemic polyarthritis"), Exercise Tandem Thrust 97, Queensland, Australia, March 1997

In March 1997, the US Pacific Command sponsored a large combined military exercise called Tandem Thrust 97. The exercise involved approximately 28,000 US and Australian troops, of whom approximately 9,000 engaged in ground operations in the Australian Army's Shoalwater Bay Training Area in southeastern Queensland.

Pre-exercise activities: Assessment of exercise-relevant medical threats identified the following: injuries, heat stress, poisonous snakes, scorpions, toxic plants, venomous marine animals, and arboviruses. Arboviruses endemic to the region included flaviviruses (Murray Valley, dengue, Kunjin, Kokobera) and alphaviruses (Ross River, Barmah Forest, Sindbis). Ross River virus (RRv) evoked particular concern since RRv disease was hyperendemic in eastern Queensland; the season of peak vector activity — and hence of peak transmission — was February through April; and during the exercise, large numbers of immunologically naïve US troops would be heavily exposed for as long as two months to the two predominant mosquito vectors of RRv: *Aedes vigilax* and *Culex annulirostris*. In addition, although RRv disease (also called "epidemic polyarthritis") is self-limited, not life threatening, and not permanently disabling, it can cause debilitating fatigue and multifocal joint pains that can persist for weeks to several years[1,2].

Since there are no vaccines or prophylactic drugs against RRv, personal measures that protect against bites of infected mosquitoes are essential for its prevention. In advance of the exercise, a preventive medicine guidance message was issued. The message enumerated the major exercise-related medical threats and emphasized the following countermeasures: treat uniforms with permethrin, minimize skin exposure (e.g., long sleeves), use DEET repellent cream on exposed skin, and properly use permethrin-treated bednets. The message also directed that all personnel receive a detailed medical threats and countermeasures briefing prior to deployment.

Because of the nature and scope of mainly infectious threats, a US Navy public health unit

called the Deployed Public Health Laboratory (DPHL) was included in the exercise force structure. The DPHL staff included an entomologist, a microbiologist, an environmental health officer, five preventive medicine technicians, and an advanced laboratory technician. The DPHL was headed by the task force preventive medicine officer who reported to the task force surgeon and the commander of the combined medical treatment facility.

Finally, approximately 1,350 sera were drawn from marines, sailors, and soldiers stationed in California, Hawaii, and Okinawa. Units were selected to participate in the survey based on their anticipated dispersion throughout the training area and convenience of specimen collection.

Case detection and evaluation: In preparation for the exercise, medical staffs were briefed regarding RRv, and notices were placed in all major treatment facilities. Medical providers were requested to inform the DPHL of patients with joint pain (other than trauma related), rash, fatigue, lethargy, fever, or lymphadenopathy so that they could be tested for antibody to RRv.

During a four-week period, 19 patients were referred to the DPHL for evaluation of possible RRv. Of these, six (5 US and 1 Australian) had IgM to RRv by ELISA antibody capture assay (all cases identified by the DPHL were confirmed by neutralization assay at the Institute of Clinical Pathology and Medical Research, Westmead, New South Wales). Of note, two patients seroconverted from IgM-negative to IgM-positive between the day of initial presentation and the next; in both cases, RRv was isolated from the earlier (IgM-negative) of the samples. These were the first reported human isolates of RRv in Australia in 1997[3].

The six RRv cases had the following clinical manifestations (number of patients with each): joint pain (6), rash (5), fatigue (4), anorexia (4), lethargy (3), adenopathy (1), and fever (1).

Arthropod surveillance: During a five week period, more than 38,000 mosquitoes were trapped at 15 sites on 19 nights. Adult mosquitoes were frozen on dry ice and shipped to the Department of Medical Entomology, University of Sydney. *Aedes vigilax* and *Culex annulirostris* (the two principal vectors of RRv in the region) were the most numerous of the 40 species in the sample. In assessments of pools of 25 mosquitoes each, five RRv isolates were recovered from four mosquito species: *Aedes vigilax*, *Culex annulirostris*, *Aedes funereus*, and *Aedes procax*.

Countermeasures compliance: None of the six confirmed cases had used adequate measures – in fact, most had done nothing specifically – to prevent mosquito bites.

To assess overall compliance with the use of bednets among exercise participants, the DPHL staff conducted a survey of four camps. Occupied cots (n=575) in 79 tents were evaluated for the presence, correct installation (i.e., suspended from inside net poles), and correct use (i.e., tucked under bedding on at least two sides) of bednets. The survey revealed that 67% of cots had nets

Results from personal protective measures survey

	Always	Usually	Sometimes	Never
Wear treated uniforms	80%	1%	1%	18%
Use DEET lotion	34%	3%	30%	32%
Sleep under bednet	75%	2%	7%	16%
Tuck in bednet	42%	1%	11%	45%
Outdoors: Work without a blouse	18%	23%	8%	51%
Outdoors: Wear sleeves up	88%	0%	9%	11%

(range, by camp: 38% - 92%), 15% were correctly installed (range, by camp: 4% - 40%), and 7% were correctly used (range, by camp: 2% - 26%). Results of the survey were shared with appropriate commands, and significant actions were taken to address documented problems.

The DPHL staff also surveyed a convenience sample of 78 troops regarding their use of personal protective measures against arthropods. The results are summarized in the table on page 14.

Post-exercise surveillance: Information concerning RRv was disseminated to medical treatment facilities at home bases of exercise participants. Subsequently, there were nearly 50 inquiries concerning testing of troops with RRv compatible symptoms; of these, 41 submitted sera for testing, and two were positive (both subsequently confirmed by neutralization assay). The serum of a third symptomatic patient was reportedly positive at another laboratory.

Finally, a subset of routinely collected post-exercise sera (currently approximately 800) are being tested to estimate rates of infection with and spectra of clinical responses to RRv, Barmah Forest virus, and exercise-relevant flaviviruses.

Comment: Ross River virus (RRv) is an arthropod-borne virus ("arbovirus") that was first isolated by Doherty and colleagues in 1963. Human infections with RRv are clinically manifested by polyarthralgias and fatigue which are generally self-limited but commonly of long duration.[2,3] RRv disease ("epidemic polyarthritis") is most common in eastern Australia. However, cases have been documented in all regions of Australia[1,4,5] and on many islands of the South Pacific.[6,7] Many domestic and wild animals are potential reservoirs of RRv; in turn, RRv has been isolated from more than ten mosquito species.

Since exercise Tandem Thrust 97 occurred in eastern Australia during the rainy season, the RRv threat was considered both operationally and medically significant. Pre-exercise activities ensured widespread awareness of the RRv threat among troops, medical personnel, and commanders. Still, compliance with prescribed countermeasures was poor, and there were at least 8 cases of "epidemic polyarthritis" among exercise participants.

The DPHL, a laboratory dedicated to preventive medicine and public health support of the exercise, provided the capability to rapidly diagnose RRv in clinically suspected cases. In addition, DPHL survey teams documented the distribution, concentration, and characteristics of mosquitoes in the training area. Finally, DPHL staff identified and quantified deficiencies in the employment of personal protective countermeasures against arthropods. As a result, the DPHL was able to rapidly detect and enumerate RRv cases, identify areas of significant vulnerability to additional cases, and focus command attention on specific, operationally significant countermeasures.

Submitted by CDR J Yund, MR Montville, Navy Environmental and Preventive Medicine Unit No. 6, Pearl Harbor, Hawaii; SE Cope, Navy Environmental Health Center, Norfolk, Virginia; L Hueston, Arbovirus and Emerging Disease Unit, Institute for Clinical Pathology and Medical Research, Westmead, New South Wales, Australia; RC Russell, Department of Medical Entomology University of Sydney, New South Wales, Australia; and GS Parker, Naval Hospital, Bremerton, Washington.

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Supplement: Reportable Diseases

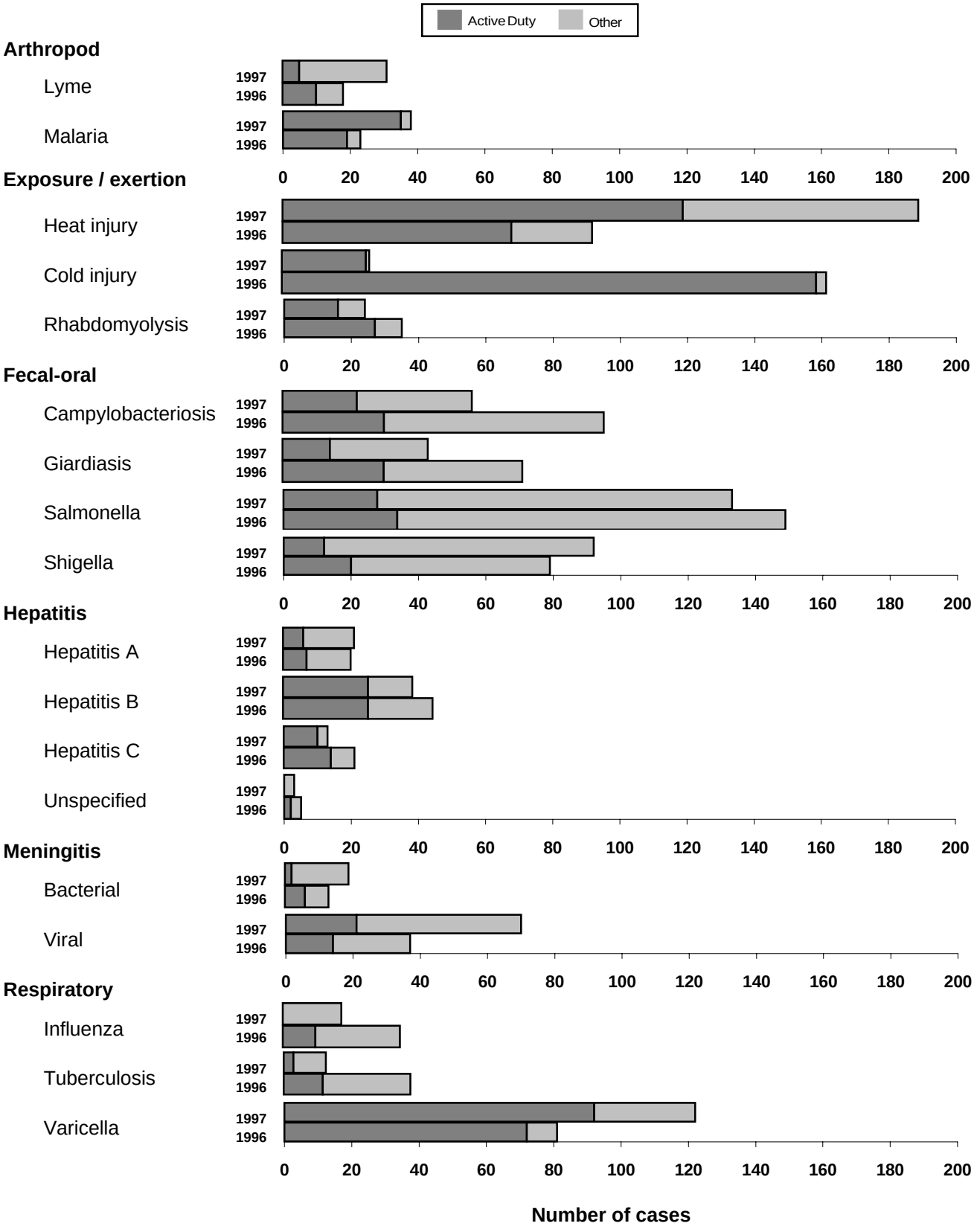
TABLE S1. Reportable conditions reported through Medical Surveillance System, Jan-Sep 1997*

Diagnosis	1st Quarter	2nd Quarter	3rd Quarter	Total	Diagnosis	1st Quarter	2nd Quarter	3rd Quarter	Total
Amebiasis	0	0	0	**0**	Malaria, falciparum	1	0	5	**6**
Anthrax	0	0	0	**0**	Malaria, malariae	0	0	0	**0**
Arboviral fever, unsp.	0	0	0	**0**	Malaria, ovale	0	0	0	**0**
Asbestosis	0	0	0	**0**	Malaria, unspecified	0	4	1	**5**
Botulism	0	1	0	**1**	Malaria, vivax	1	4	22	**27**
Brucellosis	0	1	0	**1**	Measles	0	5	1	**6**
Campylobacteriosis	15	17	24	**56**	Meningitis, Viral	9	19	42	**70**
Carbon monoxide intx.	4	4	10	**18**	Meningitis, Bact.	7	7	5	**19**
Chancroid	0	0	1	**1**	Mercury intoxication	0	0	0	**0**
Chemical agent exp.	2	1	0	**3**	Mumps (adults only)	4	2	1	**7**
Chlamydia	1219	1238	1235	**3692**	Mycobacterial inf.	1	1	1	**3**
Cholera	0	0	0	**0**	Pertussis	2	0	2	**4**
Coccidioidomycosis	2	1	0	**3**	Plague	0	0	0	**0**
CWI, frostbite	25	0	0	**25**	Pneumococcal pneum.	0	1	1	**2**
CWI, hypothermia	0	0	0	**0**	Poliomyelitis	0	0	0	**0**
CWI, immersion type	0	0	0	**0**	Psittacosis	0	0	0	**0**
CWI, unspecified	1	0	0	**1**	Q fever	0	0	0	**0**
Dengue fever	1	2	0	**3**	Rabies, human	0	0	0	**0**
Diphtheria	0	0	0	**0**	Radiation injury	0	0	0	**0**
Ehrlichiosis	0	0	2	**2**	Relapsing fever	0	0	0	**0**
Encephalitis	1	2	1	**4**	Reye syndrome	0	0	0	**0**
Giardiasis	15	6	22	**43**	Rhabdomyolysis	7	5	12	**24**
Gonorrhea	385	395	414	**1194**	Rheumatic fever	0	0	0	**0**
Granuloma Inguinale	8	2	0	**10**	Rift Valley Fever	0	0	0	**0**
Guillain-Barre Syndrome	4	1	0	**5**	RMSF	0	1	0	**1**
H. influenzae, inv.	2	3	2	**7**	Rubella	1	1	0	**2**
Heat exhaustion	4	51	84	**139**	Salmonellosis	17	38	79	**134**
Heat stroke	6	13	31	**50**	Schistosomiasis	0	0	0	**0**
Hemorrhagic fever	0	0	0	**0**	Shigellosis	6	39	47	**92**
Hepatitis A, Acute	4	10	7	**21**	Syphilis, congenital	1	1	1	**3**
Hepatitis B, Acute	20	11	7	**38**	Syphilis, tertiary	0	2	0	**2**
Hepatitis C, Acute	2	6	5	**13**	Syphilis, latent	6	3	7	**16**
Hepatitis, unspec.	0	1	2	**3**	Syphilis, prim/sec	5	4	9	**18**
Herpes Simplex	200	170	125	**495**	Syphilis, unspec.	5	4	8	**17**
Influenza	18	0	0	**18**	Tetanus	0	0	1	**1**
Kawasaki syndrome	2	1	0	**3**	Toxic shock syndrome	0	0	1	**1**
Lead poisoning	2	3	1	**6**	Toxoplasmosis	0	1	0	**1**
Legionellosis	0	0	0	**0**	Trichinellosis	0	0	0	**0**
Leish, cutaneous	8	3	0	**11**	Trypanosomiasis, Afr.	0	0	0	**0**
Leish, mucocutaneous	0	0	0	**0**	Trypanosomiasis, Amer.	0	0	0	**0**
Leish, unspecified	0	0	0	**0**	Tuberculosis, pulminary	4	5	4	**13**
Leish, visceral	0	0	0	**0**	Tularemia	1	0	0	**1**
Leish, viscerotropic	0	0	0	**0**	Typhoid fever	0	0	1	**1**
Leprosy	0	1	1	**2**	Typhus fever	0	0	0	**0**
Leptospirosis	0	0	0	**0**	Urethritis, non-specific	212	213	196	**621**
Listeriosis	0	0	0	**0**	Vaccine advrs event	0	0	0	**0**
Lyme disease	5	5	21	**31**	Varicella,adult only	63	34	25	**122**
Lymphogranuloma Vnrm	12	14	1	**27**	Yellow fever	0	0	0	**0**
					Total	**2320**	**2357**	**2468**	**7145**

* Based on date of onset.

Date of report: 7-Oct-97

FIGURE S1. Sentinel reportable diseases, United States Army*
Comparison of first nine months of calendar years 1997 and 1996

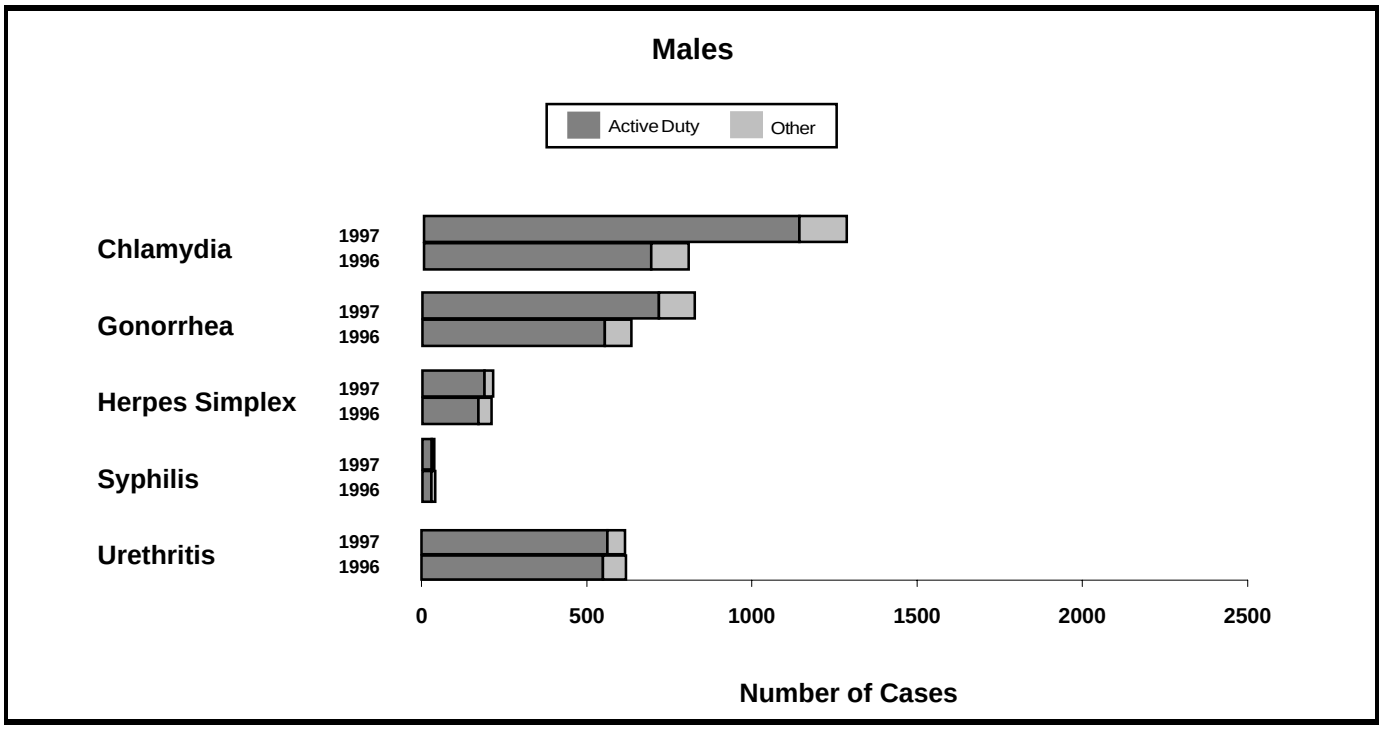


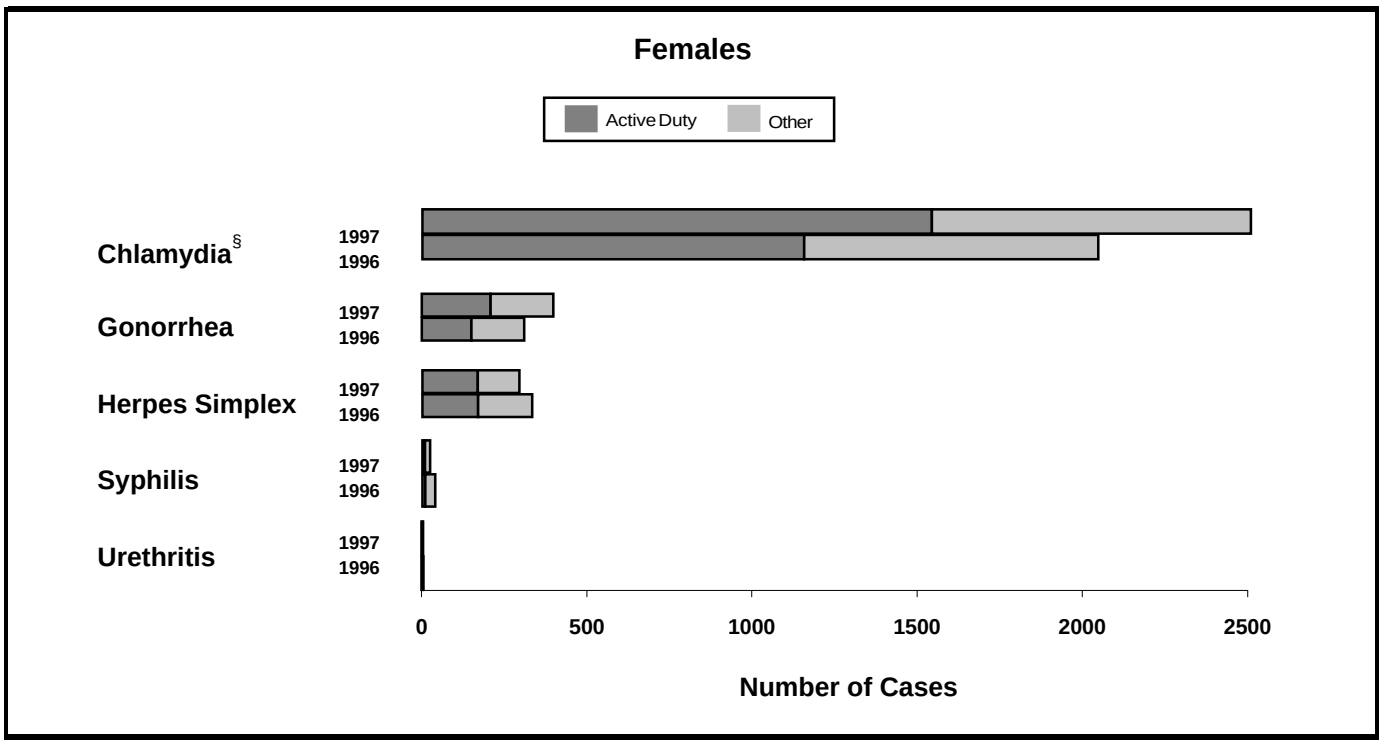
* Based on date of onset.

** Reports are included from main and satellite clinics. Not all sites reporting.

Date of Report: 7-Oct-97

FIGURE S2. Sentinel reportable STDs, United States Army*
Comparison of first nine months, by gender, calendar years 1997 and 1996





* Based on date of onset.

** Reports are included from main and satellite clinics. Not all sites reporting.

§ Includes participants in a large-scale ongoing chlamydia study (females only).

Date of Report: 7-Oct-97

TABLE III. Active duty force strength by MTF, United States Army, June, 1997*

MTF/Post**	Males							Females							All
	< 20	20-24	25-29	30-34	35-39	>= 40	Total M	< 20	20-24	25-29	30-34	35-39	>= 40	Total F	
NORTH ATLANTIC RMC															
Walter Reed AMC	130	1237	1363	1566	1810	3246	**9352**	25	367	547	495	475	592	**2501**	**11853**
Aberdeen Prov. Ground, MD	250	659	354	397	431	369	**2460**	64	127	101	63	54	34	**443**	**2903**
FT Belvoir, VA	28	289	380	317	303	370	**1687**	9	92	131	100	74	60	**466**	**2153**
FT Bragg, NC	1620	12139	9289	6527	4207	2527	**36309**	243	1549	1328	711	469	241	**4541**	**40850**
FT Drum, NY	400	3383	2363	1366	943	511	**8966**	74	437	244	134	94	44	**1027**	**9993**
FT Eustis, VA	249	1425	1174	953	861	893	**5555**	86	484	333	185	150	105	**1343**	**6898**
FT Knox, KY	641	2035	1437	1280	1241	793	**7427**	51	210	174	147	99	78	**759**	**8186**
FT Lee, VA	353	998	770	617	503	403	**3644**	208	418	250	180	115	85	**1256**	**4900**
FT Meade, MD	55	743	1050	956	788	909	**4501**	38	284	299	231	206	159	**1217**	**5718**
West Point, NY	10	277	269	719	637	639	**2551**	5	76	63	113	107	77	**441**	**2992**
GREAT PLAINS RMC															
Brooke AMC	246	990	981	1020	824	985	**5046**	188	505	449	361	314	313	**2130**	**7176**
FT Carson, CO	505	4112	3366	2250	1618	913	**12764**	138	618	460	255	167	107	**1745**	**14509**
FT Hood, TX	1529	12982	9076	5736	3943	2427	**35693**	325	2235	1603	870	581	307	**5921**	**41614**
FT Leavenworth, KS	13	260	237	403	742	621	**2276**	18	82	62	71	95	54	**382**	**2658**
FT Leonard Wood, MO	1057	1720	1122	1042	865	547	**6353**	462	553	285	157	99	75	**1631**	**7984**
FT Polk, LA	397	2497	1659	1211	804	434	**7002**	104	419	275	143	84	59	**1084**	**8086**
FT Riley, KS	623	3703	2143	1388	899	499	**9255**	108	449	267	168	83	65	**1140**	**10395**
FT Sill, OK	1524	4169	2713	1765	1460	835	**12466**	87	429	314	182	110	75	**1197**	**13663**
Panama	72	657	736	661	574	479	**3179**	6	102	128	84	75	32	**427**	**3606**
SOUTHEAST RMC															
Eisenhower AMC	763	2180	1510	1158	1368	1221	**8200**	214	593	464	350	323	233	**2177**	**10377**
FT Benning, GA	1890	4682	3246	2146	1446	787	**14197**	120	492	381	225	141	79	**1438**	**15635**
FT Campbell, KY	916	6855	5856	3531	2341	1170	**20669**	152	1030	736	396	237	104	**2655**	**23324**
FT Jackson, SC	827	1579	929	1008	693	443	**5479**	491	710	385	304	184	109	**2183**	**7662**
FT McClellan, AL	281	701	497	563	501	403	**2946**	105	260	158	106	95	62	**786**	**3732**
FT Rucker, AL	46	534	920	648	509	443	**3100**	33	171	131	76	57	38	**506**	**3606**
FT Stewart, GA	792	6130	4434	2718	1859	1086	**17019**	149	989	738	355	216	112	**2559**	**19578**
SOUTHWEST RMC															
Wm Beaumont AMC	416	2265	1708	1249	1073	1085	**7796**	135	599	412	217	156	160	**1679**	**9475**
FT Huachuca, AZ	186	1028	1068	800	684	492	**4258**	108	375	240	183	137	82	**1125**	**5383**
FT Irwin, CA	111	1266	894	747	521	321	**3860**	16	170	118	76	46	24	**450**	**4310**
NORTHWEST RMC															
Madigan AMC	676	5061	4098	2811	1998	1415	**16059**	155	816	672	376	268	198	**2485**	**18544**
FT Wainwright, AK	245	1872	1729	1003	663	338	**5850**	46	288	232	158	107	56	**887**	**6737**
PACIFIC RMC															
Tripler AMC	573	4008	3516	2309	1611	1079	**13096**	135	688	672	432	335	211	**2473**	**15569**
OTHER LOCATIONS															
Europe	1175	11040	10849	7515	5770	3987	**40336**	298	2113	1906	1196	917	568	**6998**	**47334**
Korea	1674	8115	6029	4442	3478	2284	**26022**	449	1586	1101	679	528	309	**4652**	**30674**
Unknown	2489	10154	8925	9398	6981	4738	**42685**§	851	2002	1452	1194	846	468	**6813**§	**49498**§
Total	**22762**	**121745**	**96690**	**72220**	**54949**	**39692**	**408058**	**5696**	**22318**	**17111**	**10973**	**8044**	**5375**	**69517**	**478958**

* Based on duty zip code. Does not account for TDY.

** Includes any subordinate catchment areas not listed separately.

§ Includes unknown age groups and unknown gender.

Source: Defense Manpower Data Center (DMDC)

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